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THE DEVELOPMENT OF THE MAN-MADE FIBRES MANUFACTURED IN INDONESIA*

prepared by

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P R E F A C E

This paper explains some general views about the development of synthetic fibres and their consumption in Indonesia since the first Five Year Development Plan (FYDP 1969-1983) up to the projection for the fourth FYDP (1984-1988).

The list of the synthetic fibre manufacturers are also presented including the problems to cope in order to produce a better product for the end of the fourth FYDP (1988).

Many institutions and private sectors who have been involved in the research and development of synthetic and natural polymers have been mentioned briefly.

Finally, this paper also mentions about the activities having been carried out by the Institute For Research And Development Of Textile Industries and its need for an International Aid.

This paper will be presented in the International Conference Of Synthetic Fibre in BEIJING, on Novembre 18 - 22,1985.

FIBRE CONSUMPTION

It was in 1969 when the Indonesian Government started with its first "Five Year Development Plan" (1rst-FYDP). The main program at that period was mainly to supply enough food and cloth for the whole people, of about 120 millions habitant with 2.1 per cent rate of birth, in an ambient of stable governmental arrangement.

As a starting point of industrialization the Indonesian enterprises have built, among others, many textile mills, more modern than before especially in spinning, weaving and finishing. By the end of the first FYDP (1973), the textile industry had developed very rapidly , especially for the products from cotton fibres . However, the textile consumption showed a gradual rising demand for synthetic fibre following the world textile consumption and trend .

Then, on the 2nd-FYDP from 1974 up to 1978 the Government has encouraged the fibre manufacturers to produce synthetic fibre by inviting foreign capital and transferring technology in textile processes, including knitting and carpet . Besides, since the early seventieth , many experts from other countries have been invited to assist the textile industries in dealing with the new technology concerning the synthetic fibre processes especially for dyeing and finishing.

These activities have reached a tremendous progress with the international aid from UNIDO/UNDP and the collaboration of the Institute Of Textile Technology in Bandung, representing the Department of Industry,which acted as counterparts for the experts from Egypt, England, India, Japan,Belgium and from other countries organized by the UNIDO/UNDP.Belateral Co operation was also held with other countries such as Dutch, Germany and France.

By the second year of the 2nd-FYDP (1975) the small products of polyester staple fibre and polyamide filament yarn appeared in the market only about 23% from the whole consumption (68278 tons). By the end of this second term,synthetic fibre production reached 65% of the whole synthetic fibre consumption in Indonesia (102,516 tons).

For the 3rd-FYDP (1979-1983) the production of the synthetic fibres increased from 72,981 tons (52.63%) up to 152,559 tons (83.25%).This increase was especially supported by the production of viscose rayon staple which was just started in 1982 . Of course, the synthetic fibre consumption (188,955 tons) was just a part of the whole textile consumption which was about 469,440 tons by the end of the 3rd-FYDP . The difference was laid on the use of 280,485 tons fibres consists of some natural fibres such as cotton (130,000 tons) , silk, wool, and some other synthetic fibres like acrylic and olefin fibre .

Along with the following five year development plan (1984 - 1988) or the 4th-FYDP, the Government has projected almost equal amount of the textile consumption per capita (± 13 m). Judging from that plan coupled with the rate of the population growth of about 2.1%, the Indonesian's habitant will be about 176 millions by the year 1988. Then, the textile consumption will cover 476,688 tons, excluding the textile production for export and import .

According to the latest data (1,2,3,4,5) the projection for the main textile material will be 416,000 tons by the end of the 4th-FYDP, which contains cotton, polyester staple, polyester filament, cellulose rayon and polyamide. While the deficiency of about 60,688 tons will be probably fulfilled by some other fibre such as wool, silk, olefin, ramie, jute,etc. Comparing with the composition of fibre demand in the market for the year 1977 and 1984 as presented in the Table 1 with the projecting demand for the year 1988, the position of the fibre consumption does not change much between 1984 and 1988, with the main demand for cotton , polyester and cellulose rayon. While for the year 1977 from the second FYDP, the demand was also in the order of cotton and polyester followed by cellulose, but the fibre composition was slightly different in term of percentage.

It seems that the demand for polyamide and acrylic fibre does not increase much, since those two fibres were mainly

TABLE 1

THE COMPOSITION OF THE FIBRE DEMAND
IN THE MARKET ⁻⁻)

Type Of Fibre	Fibre Composition (%) For The Year :		
	1977	1984	1988
Cotton	37.59	31.01	33.35
Polyester	34.57	29.82	32.31
Cellulose Rayon	9.35	12.17	13.22
Acrylic	0.96	4.77	5.24
Polyamide	4.16	2.86	3.15
Other Fibres	13.37	19.37	12.73
TOTAL (%)	100.00	100.00	100.00
FABRIC (tons)	212,430	419,190	476,688
Consumption/cpt	9 m	12.97 m	13.55 m
Calculated total fibre consumption (tons) ⁻)	233,673	461,109	524,357

⁻⁻) This data was recalculated from the sources (5,6,7)

Note: ⁻) Average waste in spinning and weaving 10%
1 metre fabric weighs 200 grams .

used for carpet and some hosiery fabrics due to the lack of some properties which is suitable for apparel material. The demand for cotton, polyester and rayon remains almost constant in term of percentage. As a tropical country Indonesia does not need such a heavy clothing, consequently cotton, rayon and their blends with polyester will be chosen for apparel material. Polyester and rayon are also used as home furnishing and industrial fabric along with the other synthetic fibres like polyamide, acrylic, olefin and acetate .

If the average waste in spinning and weaving process equals to 10 % and one metre fabric weighs 200 grams, the total fibre consumption will be 524,357 tons by the end of the fourth five year development plan in 1988. The consumption of the synthetic fibre calculated from the fibre composition as mentioned in the Table 1 , will be about 282,733 tons with domestic production of about 85 % or 240,323 tons .

SYNTHETIC FIBRE MANUFACTURER

To meet the demand for the fibre and textile consumption by the end of the fourth FYDP, some preparation must be accomplished either by the Government or the private enterprises. Up to June 1984, there were already 15 companies or institutions listed as the synthetic fibre manufacturers, as presented in the following Table 2 .

Most of the companies are cooperating with foreign capitals from Japan, Korea, and India or sharing with other private companies in Indonesia.

TABLE 2

THE LIST OF THE
SYNTHETIC FIBRE MANUFACTURERS IN INDONESIA (3)

No.	Name Of The Company	Type Of Production	Location
1.	Institute for R&D of Cellulose Indust	Viscose rayon (filament& staple)	Bandung, West Java (pilot plant)
2.	PT.Indo Barat Rayon	Viscose rayon (staple)	Desa Cilangkap,Purwakarta, West Java
3.	PT.South Pacific Viscose	Viscose rayon (staple)	Purwakarta, West Java
4.	PT. Indonesia Asahi Chemical	Nylon 6 (filament)	Jatiluhur,Purwakarta, West Java
5.	PT.Indonesia Toray Synthetics	Nylon 6 (filament) Polyester (staple)	Tangerang, West Java
6.	PT.Industri Sandang I	Polyester (staple)	Tangerang, West Java ^^
7.	PT.Kuma Fiber (Kurary Manunggal Fibre Industries)	Polyester (staple)	Cikokol, Tangerang , West Java
8.	PT.Shinta Indah Djaya	Nylon 6 (filament)	Tangerang, West Java
9.	PT.Susila Indah Synthetic	Polyester (filament)	Tangerang,West Java
10.	PT.Tifico (Teijin Industry Fibre Corp)	Polyester (filament and staple)	Tangerang, West Java
11.	PT.Tolaram	Polyester (filament)	Tangerang,West Java
12.	PT.Tri Rempoa Solo Synthetic	Polyester (staple)	Tangerang, West Java
13.	PT. Yasinta	Polyester (staple)	Tangerang, West Java
14.	PT.Texmaco Taman Synthetic	Polyester (filament)	Kaliwungu-Kendal, Central Java
15.	PT.Industri Sandang II	Polyester (filament) Viscose rayon (stp)	South Sumatra ^^ West Kalimantan ^^

^^ in preparation

The kinds of fibres produced in Indonesia are mainly regular fibres. As the future market demand does not only fulfil the textile need, without thinking of comfort like what has happened in the last decade, the production for modified fibre or new textile material which is suitable for tropical country has to be considered .

Accordingly the modified fibres (such as cationic or anionic dyeable polyester with high moisture regain, high modulus and high resilience viscose rayon fibre, high melting point with low elongation polyamide fibre, etc.) should be produced along with the regular fibre. Modified polypropylene with high dyeability, high moisture regain and high melting point with high resistant to photo oxydation, can be considered as the new textile material.

RESEARCH AND DEVELOPMENT

Many institutions have put their interest on polymer research and development since the beginning of the second FYDP or since the early seventieth. These activities have been started by the foundation of the Indonesian Polymer Association with the membership from many institutions and private sectors. Some seminars and symposiums were held by this association either in Bandung or in Jakarta. Some important meetings about synthetic fibre and polymer research and development in foreign countries like Japan, Sweden, Singapore, Canada, France, U.S.A. , England Thailand, etc. were also attended by the Indonesian scientists or industrialists .

Among the institutions which have involved in the research and development (R&D) for synthetic and natural polymers are :

-Institute for Research and Debelopment (IRD) of Textile Industries)IRDTI), Cellulose Industries (IRDCI), Chemical Industries (IRDCHI), Batik and Handicraft Industries (IRDBHI), Leather and Plastic Industries (IRDLPI). These IRD are organized by the Department of Industry through The Agency for R&D of Industries (ARDI).

-IRD of Rubber Industries organized by the Department of Agriculture and Plantation.

-Institute Sciences of Indonesia (LIPI) .

-Centre Application of Isotops and Radiations (PAIR) which is organized by the National Atomic Energy Agency (BATAN).

-Bandung Institute of Technology organized by the Depart - ment of Education.

-Indonesian Petroleum Company (PERTAMINA) and IRD of Oil & Gas (LEMIGAS) organized by the Department of Mining and Energy.

-Agency for Controlling and Testing of Technology (BPPT) .

-Association of Indonesian Synthetic Fibre Manufacturers (APSYFI).

-Indonesian Polymer Association , and other private sectors and industrialists.

Since each R&D in synthetic fibres and polymers will also involve with the ability of the researchers and industries to find enough chemicals and monomers in the market without any problem and difficulty, then, it is a challenge for the Government through its R&D in the chemical industries, to cope with the problems. They have to be able to create a suitable environment for encouraging the private sectors to increase and to inprove the products in the up-stream industries such as the aromatic and petro-chemical industries in producing the monomers, catalysts, solvents, etc.

INSTITUTE FOR R&D OF TEXTILE INDUSTRIES

IRDTI or the former Institute of Textile Technology in cooperating with the Centre Application of Isotops and Radiations have been doing some research on modification of textile fibres by means of radiation induced graft polymerization. The research was merely focused on the modification of the polypropylene and polyester fibres for their hydrophylization. This method was also applied on the cellulose fibre to gain some properties in crease resistant and dimensional stability to substitute the convensional process with resin finish.

IRDTI has also been experimenting the synthese of the resins to be used as binder in pigment printing and resin finishing on various fibres by means of emulsion polymerization. Some modifications have also been done on cotton and its blend with polyester fibre to improve their crease resistant, dimen-

sional stability and dyeability to cationic dyes by means of etherification process. Chemical modification of the polypropylene and polyester fibre was also carried out in the radical polymerization using chemical initiation and catalytic modification.

In the case of testing and standardization, the IRDTI maintaines a cooperation with the APSYFI to organize standard specifications in testing the fibre quality. In dealing with the industries and maintaining the cooperation among the Asean countries with IRDTI as the Asean Fibre Testing Centre has organized many courses in cotton classification, technical quality control in spinning and up grading the spinning supervisor in management. A short and long term courses in textile technology was also given to the participants from other countries like Papua New Guinea, Malawi, Sinegal, Tanzania, Sri Lanka, etc.

Some research cooperation with other foreign institutions have also been taken place between IRDTI with the :

-Research Institute for Polymers and Textiles (RIPT),Tsukuba, Japan.

-Government Industrial Research Institute Osaka (GIRIO), Osaka, Japan.

-Centre Studies on Application of Isotops and Radiations (CEN) de Saclay, France.

-Centre Research of Technology (TNO), Delft, Holland.

INTERNATIONAL AID

Since most of the research cooperation have been involved only in the exchange researchers without having any international aid for the laboratory equipment especially for polymer synthesis and analysis, the IRDTI has faced some problems in keeping up with the latest technology in the field of synthetic fibres and resin productions .

This unfavourable condition has been the main cause for having a rather big gap between IRDTI with the textile industries especially with the synthetic fibre manufacturers.
Although the IRDTI does not have any direct relation with the research and development in the up stream industries for producing monomers and catalysts, the IRDTI pays a great attention on their production and quality.

The IRDTI can support the industries by organizing training courses and quality control in the field of fibre processing and testing, including the research and development in improving the fibre properties. If all the research products in modifying, synthesizing the fibres and polymers done by the IRDTI can be applied in the bigger scale such as in pilot scale, it will be just one more step for the application in the industries.

This consideration must be taken into account on the basis of ameliorating the fibre and resin properties, in order to fulfil a better product for the textile consumption by the

end of the 4th five year development plan in 1988.

Judging from the past that the development of the textile industries in Indonesia has been improved rapidly by international aid especially by the UNIDO/UNDP and some foreign capitals, it will be more complete and perfect if some more international aids could be given to our Institute through the Department of Industry- c.q. the Agency for R&D of Industries.

With adequate aid the Institute will be able to run for the R&D of textile industries and giving some assistances to the synthetic fibre manufacturers as the fibre research and testing centre. The IRDTI will be able to improve some activities in the synthesizing, analysing and modifying the textile fibres and resin finish polymer in the pilot scale . So that the final result can be developed and applied in the industrial scale with a better cooperation between the Agency for R&D of Industry and its R&D institution with the synthetic fibre manufacturers. Consequently the kinds of fibre consumed will include the modified fibre which is suitable for their end uses in the tropical climate.

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